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Injury and illness among onshore workers in Alaska's seafood processing industry: Analysis of workers' compensation claims, 2014-2015

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Abstract

Background: Alaska's onshore seafood processing industry is economically vital and hazardous.

Methods: Accepted Alaska workers' compensation claims data from 2014–2015 were manually reviewed and coded with the Occupational Injury and Illness Classification System and associated work activity. Workforce data were utilized to calculate rates.

Results: 2,889 claims of nonfatal injuries/illnesses were accepted for compensation. The average annual claim rate was 63 per 1,000 workers. This was significantly higher than Alaska's all-industry rate of 44 claims per 1,000 workers (RR=1.42, 95% CI=1.37–1.48). The most frequently occurring injuries/illnesses, were: by nature, sprains/strains/tears (993, 36%); by body part, upper limbs (1,212, 43%); and by event, contact with objects/equipment (1,020, 37%) and overexertion/bodily reaction (933, 34%). Incidents associated with seafood processing/canning/freezing (n=818) frequently involved: repetitive motion; overexertion while handling pans, fish, and buckets; and contact with fish, pans, and machinery.

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AUTHORS' CONTRIBUTIONS

LNS conceived the work; analyzed and interpreted the data; drafted the work; approved the work for publication; and agreed to be accountable for all aspects of the work. DLL, VEB, and LDK substantially contributed to the conception of the work; contributed to the analysis and interpretation of the data; revised the work critically for important intellectual content; approved the work for publication; and agreed to be accountable for all aspects of the work.

ETHICS APPROVAL AND INFORMED CONSENT

The National Institute for Occupational Safety and Health's (NIOSH) Institutional Review Board (IRB) determined that this study met the IRB definition of "research," but not "research involving human subjects" because (1) the data were originally collected for the purpose of workers' compensation claim reporting, not for the research project and (2) the researchers could not readily ascertain the identity of the individuals to whom the coded data pertain (NIOSH IRB no. HSFB 15-WSD-NR02). Likewise, the Oregon State University IRB found that this study met their definition of research but did not involve human subjects and therefore did not require full board review (study number 7561).

DISCLOSURE (AUTHORS)

The authors have no conflicts to disclose.

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.

Conclusions: Ergonomic and safety solutions should be implemented to prevent musculoskeletal injuries/illnesses.

Keywords

Fish processing; food manufacturing; worker safety and health

1 INTRODUCTION

Although processing seafood is a critical step in the supply chain for one of Alaska's most valuable natural resources, few studies have addressed workers' safety and health. This industry comprises both offshore (in large vessels) and onshore factories that engage in production and packaging activities, including: eviscerating fish; shucking shellfish; processing oils; and canning or freezing seafood.[1] During 2014–2015, Alaskan fishermen harvested the majority of the United States' seafood, with an annual average of 5.8 billion pounds, and generated the largest portion of national revenue, at $1.7 billion, with subsequent processing adding value.[2] During 2015, there were 24,863 workers in Alaska's seafood processing industry, both onshore and offshore, 22% of whom worked in the industry year-round, and 30% of whom were Alaskan residents.[3] Demographic data are only available on these 30% of all workers who were Alaskan residents, with an average age of 41 years and 68% male.[3] The majority of positions are seasonal and many out-of-state and foreign workers are recruited to meet labor demands.[4–6] While wages vary by occupation and experience, many new workers make minimum wage. Jobs are physically and mentally demanding, frequently requiring repetitive tasks in cold and wet environments, oftentimes 12 to 18 hours per day for weeks.[4–6]

The Alaska Occupational Safety and Health Section [AKOSH] regulates onshore factories and has categorized seafood processing as a high-hazard industry.[7] During 2014–2015, the Census of Fatal Occupational Injuries did not report any fatalities in this industry.[8] Although the fatality risk is low, there is evidence that the risk of nonfatal injuries and illnesses is elevated. The Survey of Occupational Injuries and Illnesses (SOII) reported that in 2015, Alaska's broad "food manufacturing" industry experienced a rate of 8.3 injuries/illness per 100 full-time workers, which was twice the all-industry rate of 4 per 100 full-time workers.[9] Within that broad category, SOII data on seafood processing, specifically, are unavailable. However, seafood processing industry workers constitute over 95% of all food manufacturers in Alaska.[10]

Limited research has investigated hazards and risk factors in the seafood processing industry. Globally, seafood processors are at high risk for developing dermatologic and respiratory allergic reactions.[11–14] Risk factors for musculoskeletal disorders include: highly repetitive and forceful upper extremity movements; localized mechanical stress; awkward and/or static postures at workstations; prolonged standing; temperature extremes; and poor workplace organization.[15–18] Two recent studies have investigated acute traumatic injuries among offshore seafood processors working in Alaskan waters. The first study analyzed injuries among all crewmembers (deckhands, processors, engineers, etc.) during 2001–2012 working onboard two fleets with the capability to harvest and process seafood, freezer-longliners and

freezer-trawlers (also known as amendment 80 or non-Pollock catcher-processor vessels). This study found that processing tasks were responsible for most of the lacerations, punctures, avulsions, amputations, and poisonings among all crewmembers, with the most frequent causes including being caught in running processing equipment and slipping knives.[19] The second study focused solely on injuries among offshore processors during 2010–2015, across the multiple catcher-processor and mothership fleets operating in Alaska. This study identified one fatal and 304 nonfatal injuries among processors that were reported to the US Coast Guard. No injuries were attributed to vessel disasters or falls overboard. The single fatal injury involved the worker becoming caught between a conveyor belt and a wall in the vessel's freezer hold. The most frequently occurring nonfatal injuries were sprains/strains/tears, contusions, and fractures. The work activities most frequently associated with injuries were processing seafood on the production line, stacking blocks/bags of frozen product, and repairing/maintaining/cleaning factory equipment.[20] Neither study was able to calculate injury rates among seafood processors, specifically, due to a lack of workforce denominator data by occupation. To date, there have been no epidemiologic studies on Alaska's onshore seafood processing industry. Recent studies on Washington State's and Oregon's seafood processing industries have shown high rates of accepted workers' compensation (WC) claims.[21–22] Limitations of the Oregon study were that (a) it analyzed workers' compensation disabling claims, which represented only the most severe incidents, and (b) the dataset did not provide a narrative description of the injury/illness characteristics and circumstances, and therefore it was not possible to identify the work activity associated with the injury/illness.[22]

WC claim reports provide a rich source of information for safety and health research and surveillance.[23] In Alaska, the Division of Workers' Compensation is charged with administering the Alaska Workers' Compensation Act, which requires employers or their insurance carriers to pay for injured or ill employees' work-related medical, disability, and reemployment benefits.[24] Employers must report to the Division an employee's death, injury, disease, or infection that arises out of and in the course of employment.[25] For a variety of coverage-related legal reasons, WC claims are an inadequate data source for injuries/illness among offshore workers.[26–27] For onshore workers – who are more uniformly covered by the Alaska Workers' Compensation Act – the "remote site doctrine" can apply in certain geographic locations. The principle behind this doctrine is that workers at remote sites are required to eat, sleep, and socialize on employers' premises. Therefore, injury and illness caused by personal activities on employers' premises must be compensated.[28] For onshore workers, this study aimed to (a) estimate the risk of injuries and illnesses, (b) determine injury and illness patterns, and (c) identify modifiable workplace hazards.

2 METHODS

2.1 Claims data

The Alaska Division of Workers' Compensation provided the dataset for analysis in February, 2017. For inclusion in this study, claims had to represent incidents that: occurred during 2014–2015; were nonfatal; occurred onshore in Alaska; and were approved for

compensation. Claims for the seafood processing industry were identified by the North American Industrial Classification System code 3117[1] as well as keyword searches. The dataset included information needed to administer claims: (a) employer; (b) employee demographics; (c) location; (d) freeform narrative describing the injury/illness; (e) Workers' Compensation Insurance Organizations (WCIO) system codes[29]; and (f) injury/illness treatment and outcomes.

2.2 Claims coding

To determine if an incident occurred onshore, we reviewed the following variables: employer name; street; city; postal code; and narrative. We manually coded the incident's geographic region from these variables, using standard categories.[3] To provide an increased level of detail and quality control, we manually reviewed and coded all claims with the Occupational Injury and Illness Classification System (OIICS), which describes the nature of injury/illness, body part affected, event/exposure resulting in injury/illness, and source of injury/illness.[30] For OIICS coding, we utilized the dataset's freeform narratives. If narratives lacked sufficient information, then we referenced the existing WCIO codes. We also used the narratives to code the work activity associated with injury/illness. We developed work activity codes inductively during the data review, following an interpretive content analysis approach.[31] For quality control, the lead author flagged coding decisions about which they felt uncertain for co-authors' further review. Any coding discrepancies were resolved through consensus.

2.3 Analysis and workforce data

To identify patterns and describe characteristics in the data, we calculated descriptive statistics, including frequencies, percent distributions, and cross-tabulations in Stata version 14.2. To compare the onshore seafood processing industry's average annual claim rate to the all-industry rate, we calculated a rate ratio and 95% confidence interval. To calculate rates, we utilized worker count data from the Alaska Department of Labor and Workforce Development's Research and Analysis Section. For the seafood processing industry, the Section provided data on annual onshore worker counts and the number of onshore workers in each region.[3] Each worker employed in the onshore industry at any time during the year was counted once. However, for the geographic region counts, a single worker who moved during the year and worked in multiple regions was counted in each region. Additionally, the Section provided the state-wide, all-industry worker counts.

3 RESULTS

For all industries in Alaska during 2014–2015, there were 37,240 claims for nonfatal injuries/illnesses that were approved for compensation. Of the 40 fatalities excluded from this analysis, none occurred in the seafood processing industry. There were 3,161 claims in the entire seafood processing industry, both onshore and offshore. Claims for offshore incidents (128) and those in unknown locations (52) were excluded from the analysis. Claims for medical testing (92), which involved a few instances in which one worker with tuberculosis potentially could have exposed many others, were also excluded, because they did not represent injury/illness. Therefore, 2,889 claims among onshore workers in the

seafood processing industry were included in this analysis. Workers' ages ranged from 16–79 years, with a median of 37 years. Most claims (82%) were among men. Information on workers' date of hire was missing for 75% of claims.

3.1 Claim rates

Table 1 presents the claim frequency and percentage, worker count, and claim rate for (a) all industries in Alaska, (b) the onshore seafood processing industry, and (c) the seafood processing industry's geographic regions. The onshore seafood processing industry's average annual claim rate, at 63 claims per 1,000 workers, was significantly higher than the all-industry rate of 44 claims per 1,000 workers (rate ratio = 1.42, 95% CI = 1.37–1.48). The seafood processing industry's claim rate increased from 57 claims per 1,000 workers in 2014, to 70 claims per 1,000 workers in 2015. By region, one-third (32%) of the claims occurred in the Aleutians and Pribilof Islands, which also had the highest average annual rate, at 62 claims per 1,000 workers. The Alaska Department of Labor and Workforce Development's webpage on the seafood industry provides an interactive map of these geographic regions.[3]

3.2 Injury and illness characteristics

Table 2 presents the nature of injury or illness and the body part affected. Sprains, strains, and tears accounted for 36% of all claims, and occurred primarily to workers' trunk and upper limbs. By body part, 43% of incidents involved upper limbs. The 13 amputations involved 10 fingers and 3 fingertips. Other musculoskeletal injuries/illnesses included: unspecified soft tissue conditions that occurred over time due to repetitive activity (61); carpal tunnel syndrome (32); dorsopathies (9); epicondylitis (6); and tendonitis (6). Pain, inflammation, and irritation to workers' faces frequently involved dirty water, fish, particles, or chemicals splashing into eyes.

3.3 Causes of injury and illness

Table 3 presents the event/exposure resulting in injury or illness (both general and detailed categories) and nature. For event/exposure, the category 'overexertion and bodily reaction' describes injury or illness that resulted from free bodily motion, excessive physical effort, repetition of a bodily motion, the assumption of an unnatural position, or remaining in the same position over a period of time.[30] By event, the majority of incidents involved contact with objects and equipment (37%), and overexertion and bodily reaction (34%). Among injuries caused by contact with objects and equipment, over half involved the worker being struck. Injuries caused by contact with objects and equipment constituted the majority of bruises, lacerations/punctures/amputations, and fractures. Overexertion – particularly lifting, lowering, pushing, and pulling – caused the majority of sprains, strains, and tears. Repetitive motion also resulted in other musculoskeletal injuries/illnesses (107). Conditions reported as pain and inflammation that were caused by various types of overexertion (70) potentially could have been early symptoms of sprains/strains/tears or other musculoskeletal injury/illness. Of the injuries caused by slips, trips, and falls, the majority involved falls on the same level (214). Exposure to harmful substances and temperatures most frequently resulted in: infections (85); poisoning, toxic, noxious, or allergenic effects (56); burns/corrosions (36); and dermatitis (23).

3.4 Injury and illness associated with specific work activity

Over 90% of claims (2,647) were associated with a specific work activity. Of these, roughly three-quarters (1,950) had sufficiently detailed narratives to code that work activity. Of the one-quarter (697) related to a work activity that did not provide adequate information for coding, examples included: “squatting while working, lost balance and fell;” “slipped on fish guts and fell;” “lifting, pushing heavy items;” and “foot caught between forklift and rack.” In terms of injury and illness characteristics and circumstances, there was not a systematic difference between the claims that had sufficiently detailed narratives to code the work activity, and those that did not.

The most frequent work activities were: “process, can, or freeze seafood on the production line” (818); “transport, package, or handle the product away from the line” (495); “walk, climb/descend” (276); “maintenance or repair” (139); and “cleaning” (120). Within the broad “process, can, or freeze seafood on the production line” category, examples of specific tasks included: operating processing or canning machinery; heading; gutting; filleting; sorting; grading; handling/moving seafood while standing on the line; loading/unloading plate freezers; and breaking freezer pans. “Transport, package, or handle the product away from the line” included these activities: pushing/pulling carts and racks; packaging the product; carrying/moving/stacking packaged product; and operating pallet jacks or forklifts. In contrast, “walk, climb/descend” involved workers’ unburdened movement throughout the facility.

Table 4 presents the work activity, source, and event/exposure. For the source of injury/illness, the category ‘bodily motion or position’ describes the free movement of the body or its parts, with no impact involved, as well as awkward or sustained positions of the injured worker.[30] Sources are listed beneath the associated work activity. For example, while “processing/canning/freezing seafood on the production line,” 312 workers were injured by contact with objects and equipment, the most common of which were fish/shellfish (84), trays (72), processing machinery (47), and knives (28). Overexertion and bodily reaction resulted in 403 incidents. These were most frequently due to repetitive motion and handling trays, fish/shellfish, and baskets/buckets. Exposure to fish/shellfish was associated with infections, allergic reactions, dermatitis, and scratches. During transporting/packaging/handling activities away from the line, injuries frequently involved the following items, due to either overexertion or contact: boxes/cartons/bags; carts; racks; seafood; trays; and pallets/pallet jacks. Walking and climbing/descending most frequently resulted in slips, trips, and falls.

3.5 Injury and illness not associated with specific work activity

Only 8% of claims were not associated with a specific work activity. Infections account for 41 claims and pre-existing health conditions for 27. Another 15 claims covered under the remote worksite doctrine involved: falling in the shower or from bunkbeds; insect bites while asleep; and assault while off-duty. Ten assaults occurred inside factories. Motor vehicle incidents accounted for 25 claims, with a single crash injuring 19 workers. Boots, gloves, and jackets that abraded or irritated workers’ skin resulted in 22 claims. Noise-induced hearing loss resulted in 14 claims.

3.6 Injury and illness response and outcomes

Table 5 presents the injury/illness response and outcome as defined in the First Report of Injury. Initial treatment was defined as “the extent of medical treatment received by the employee immediately following the accident.” Three-quarters (74%) of incidents were initially treated with minor clinic/hospital remedies or diagnostics. More severe incidents requiring “emergency evaluation, diagnostics, or procedures” (9%) spanned across all nature of injury/illness categories, with the most frequent including: sprains, strains, tears (56); lacerations (43); bruises (41); and crushing (20). Incidents initially requiring hospitalization over 24 hours included: head injuries (2); fractures (2); lower back strains (2); a cardiovascular event (1); and unspecified injuries from a fall (1). By claim type, almost two-thirds (63%) were classified as medical only, meaning there was no additional claim for lost time. In the dataset, a “physical restrictions indicator” variable reported the “presence of physical restrictions upon the employee’s release and/or return to work.” However, data were missing for 60% of claims. Of the 1,174 claims with codes, 291 (25%) indicated the worker had a physical restriction upon release or return to work.

4 DISCUSSION

This is the first epidemiologic study to estimate risk, characterize injury and illness patterns, and identify modifiable hazards in Alaska’s onshore seafood processing industry. The majority of WC claim report narratives were sufficiently detailed to allow for OIICS and work activity coding. This study provides detailed information on injury/illness characteristics and circumstances, which can inform targeted prevention strategies and future research.

No fatalities among workers were reported during 2014–2015. This finding is consistent with CFOI data demonstrating that workers in this industry are at low-risk for fatalities.[8] However, consistent with SOII data,[9] the frequency and rate of claims for nonfatal injuries/illnesses are concerning. Each year, workers experienced over 1,300 injuries/illnesses for which they received compensation for medical treatment and/or lost work time. Compared to the all-industry average annual rate of 44 claims per 1,000 workers, the rate in the onshore seafood processing industry was significantly higher, at 63 claims per 1,000 workers. Furthermore, this claim rate likely underestimates the true risk of nonfatal injuries/illnesses. For example, in the limitations section below we discuss issues related to (a) utilizing WC claims as a data source, and (b) using worker counts as the exposure measure for calculating rates for a highly-seasonal industry. Studies in the Pacific Northwest seafood processing industry have also identified elevated rates of accepted WC claims. Research examining which industries in Washington State were high-risk for common, high-cost injuries found that the seafood processing industry experienced a rate of 31.1 claims per 1,000 FTEs during 2002–2010.[20] In Oregon during 2007–2013, there was an average annual rate of 24 disabling claims per 1,000 workers in the seafood processing industry, which was over twice the all-industry disabling claim rate. Disabling claims were a subset of all claims, representing the most severe incidents.[21] More broadly, workers in food system industries across the United States (including food creation, processing, distribution and storage, retail, and preparation) are at high risk for fatalities, injuries, and illnesses. Prior research utilizing

a farm-to-table analysis found that, compared to workers in nonfood system industries, workers in food system industries had a significantly higher morbidity rate (RR=1.62; 95% CI 1.3 to 2.01) and occupational mortality rate (RR=9.51; 95% CI = 2.47 to 36.58).[32]

In the Alaskan onshore seafood processing industry, sprains, strains, and tears constituted one-third of all claims and most frequently affected workers' trunk and upper limbs. Additionally, workers' upper limbs frequently experienced musculoskeletal injury/illness due to cumulative trauma, as well as reported pain and inflammation, which could have been symptoms of musculoskeletal injury/illness. These results, which demonstrate the importance of preventing musculoskeletal injury/illness to workers' upper limbs and trunk, are consistent with prior research.[15–20, 22] Similar to seafood processors, poultry processors are at high-risk for musculoskeletal injuries/illnesses, particularly in their upper limbs.[33–34] In both animal processing industries, facilities are designed for rapid line production and then movement of the packaged product for storage and transport, requiring strenuous, repetitive manual labor and awkward postures. Given these similarities, interventions in the poultry processing industry might be translatable to seafood processing.[34] Following musculoskeletal injuries/illnesses among onshore seafood processors in Alaska, the next most common types of injuries were bruises, lacerations/punctures/amputations, and fractures – the majority to workers' upper limbs. Exposure to seafood substances resulted in infections, dermatitis, and allergic reactions – including respiratory symptoms, which was consistent with prior research.[11–14] Crushing injuries, hearing loss, and concussions were also concerning because of their potential for causing long-term impairment.

Workers in the onshore seafood processing industry faced ergonomic-related, physical, biological, chemical, and psychosocial hazards. The most frequently occurring events were "contact with objects and equipment" (1,020) and "overexertion/bodily reaction" (993). As expected, processing/canning/freezing activities on the production line (818) and transporting/packaging/handling activities away from the line (495) were associated with the most injuries/illnesses. Common sources of injuries/illnesses included: repetitive motion and bodily position; floors/stairs/ground; fresh and frozen seafood; trays; boxes/cartons/bags; and processing machinery.

When deciding upon hazard controls, elimination and engineering controls should be favored over administrative controls and personal protective equipment (PPE), in order to provide the most effective protection.[35] Implementing ergonomic interventions is vital for improving safety and health in this industry. To develop interventions using a participatory approach, companies should implement ergonomic programs that include worker participation.[36] To prevent slips, trips, and falls, passageways should be kept clear of obstructions, with substances/seafood frequently removed. These factories are wet work environments, and proper drainage should be maintained, with appropriate gratings, mats, raised platforms, and surface design. Worksite assessments could include slip resistance testing.[37] Performing regularly-scheduled preventive maintenance, following appropriate lockout procedures, and properly guarding machinery and equipment could prevent injuries.[38–39] Less-hazardous cleaning product formulations should be utilized when possible. Potential strategies for controlling workers' dermal and respiratory exposure to seafood substances, which resulted in infections, dermatitis, and allergic reactions, include wearing

proper PPE on the processing line and while cleaning, as well as improving ventilation systems.[13] Among all accepted claims, fewer than 10% fell under the remote site doctrine. Nevertheless, employers who operate remote worksites need to ensure the safety of dormitories, cafeterias, recreational areas, and surrounding grounds.

While not accounted for in this study using WC data, work organization factors potentially could have contributed to injuries/illnesses. In mass production manufacturing environments, physical and psychosocial stressors often include repetitive and monotonous tasks, rigid work pace with physically intensive work cycles, highly-regulated break patterns, and low decision-authority and skill discretion.[40] Workers in Alaska's seafood processing industry are often on-duty for long hours every day (e.g., 12–18 hours per day) for weeks at a time.[4–6] With very long shifts, and when 12-hour shifts combine with more than 40 hours of work a week, workers' physiological performance deteriorates and they experience increased injury rates and more illness.[41]

This analysis has several limitations. First, WC claims data likely underrepresent the true burden of nonfatal conditions, and are more representative of risk for acute injuries than illnesses and cumulative injuries, due to a wide variety of factors involving reporting and compensability, especially among vulnerable workers.[23, 42] Second, using worker counts as the exposure estimate to calculate rates and make risk comparisons is not ideal, because this exposure estimate does not take into account the varying lengths of time that workers spend on the job throughout the year. In this highly-seasonal Alaskan industry, the workforce can fluctuate from a high of 20,500 in July to a low of 3,900 in December.[10] Likewise, the regional claim rates do not account for potential operational differences, such as one region having more factories with year-round operations than other regions with mainly seasonal operations. Using full-time equivalent (FTE) worker estimates, which accounts for hours worked, would have provided better risk measures, but these data currently do not exist. Third, comprehensive workforce demographic data do not exist to calculate rates by age and sex. Fourth, the dataset did not provide information on long-term disability, and injury severity was not coded. Finally, the work activity coding for cumulative trauma was based on the narratives, which might not have accounted for the possibility that multiple types of activities could have contributed to conditions.

Future research is needed to estimate (a) comprehensive demographic data, and (b) FTE denominator data for all industries in Alaska, in order to calculate injury/illness rates that allow for more accurate risk comparisons. To develop a detailed work activity classification system, researchers could collaborate with companies to visit factories and document all stages of the process – from offloading the seafood from vessels to shipping out the packaged product. To better identify high-risk activities and the specific mechanisms of injury, researchers or practitioners could also perform ergonomic and safety assessments. Researchers or employers could investigate if injuries/illnesses are associated with certain times of season, shifts, or worker fatigue. The remote location of many worksites, away from advanced medical care, might influence treatment (including if they file for workers' compensation) and outcomes, including severity and disability.

5 CONCLUSION

This study found that workers in Alaska's onshore seafood processing industry were at elevated risk for injuries and illnesses and it identified modifiable workplace hazards. Our findings highlight the need for ergonomic and safety solutions to prevent musculoskeletal injuries/illnesses in this worker population. Across the United States, workers in food system industries are at high risk for fatalities, injuries, and illnesses.[32] In contrast to the seafood processing industry, occupational safety and health in poultry and meat processing have received widespread attention. Recently, the United States Government Accountability Office made recommendations to increase efforts to study injuries, illnesses, and incident reporting among poultry and meat processing workers.[43] The seafood processing industry faces similar hazards, and likewise merits research, support, and resource investments. There is evidence that seafood processing companies that invest in safety and health can create an environment that protects their most valuable asset, the workers. For example, AKOSH's Voluntary Protection Program (VPP) and Safety and Health Achievement Recognition Program (SHARP) acknowledge employers and employees who have made outstanding efforts to achieve exemplary safety and health at their worksites.[44–45] Currently and in the past, Alaskan seafood processing worksites have earned VPP and SHARP status.[46–47] Collaborations between industry, safety and health practitioners, and researchers could effectively identify, develop, and evaluate tailored interventions to improve the health and safety of seafood processing workers.

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REFERENCES

1. North American Industry Classification System. 2017 NAICS Definition: 311710 Seafood Product Preparation and Packaging Accessed May 29, 2018 from: https://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=311710&search=2017 NAICS Search
2. National Marine Fisheries Service. Fisheries of the United States, 2015. (Current Fishery Statistics No. 2015) U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 2016 Accessed May 29, 2018 from: https://www.st.nmfs.noaa.gov/Assets/commercial/fus/fus15/documents/FUS2015.pdf
3. Alaska Department of Labor and Workforce Development. Statewide Data: Seafood Processing Data Tables Accessed August 30, 2017 from: http://live.laborstats.alaska.gov/seafood/seafoodstatewide.cfm
4. Stimpfle E Long hours on the 'slime line': Seafood processors key to Alaska's largest export. Alaska Economic Trends 2012; 32: 10–11.
5. Garcia GM, & De Castro B Working conditions, occupational injuries, and health among Filipino fish processing workers in Dutch Harbor, Alaska. Workplace Health Saf 2017; 65: 219–26. [PubMed: 27729501]

6. Cole D Immigration fight cripples Alaska fishing as foreign help vanishes. Alaska Dispatch News 2017 Accessed August 9, 2017 from: https://www.adn.com/opinions/2017/08/05/immigration-fight-cripples-alaska-fishing-as-foreign-help-vanishes/
7. Alaska Department of Labor and Workforce Development. Alaska Occupational Safety and Health (AKOSH) Strategic Plan Fiscal Years 2014–2018 Accessed May 29, 2018 from: http://labor.state.ak.us/lss/forms/FY14-18_Strategic_Plan.pdf
8. Alaska Department of Labor and Workforce Development. Workplace Fatalities: Current Data. Archived Summary Tables (2013–2015). Table A-1. Fatal occupational injuries by industry and event or exposure, Alaska, 2014 & 2015 Accessed October 5, 2017 from: http://live.laborstats.alaska.gov/fatal/pdfs/cfoihist.pdf
9. Alaska Department of Labor and Workforce Development. Nonfatal Injuries and Illnesses: Current Data. Summary Tables: 2015. Table 1: Incidence rates of injuries and illnesses by selected industries Accessed October 4, 2017 from: http://live.laborstats.alaska.gov/injill/index.cfm
10. Alaska Department of Labor and Workforce Development. Quarterly Census of Employment and Wages (QCEW) Historical Annual Data. Preliminary Annual Employment and Wages, January-December 2015 Accessed October 18, 2017 from: http://live.laborstats.alaska.gov/qcew/ee15.pdf
11. Aasmoe L, Bang B, Andorsen GS, et al. Skin symptoms in the seafood-processing industry in North Norway. Contact Derm 2005; 52: 102–7. [PubMed: 15725289]
12. Gautrin D, Cartier A, Howse D, et al. Occupational asthma and allergy in snow crab processing in Newfoundland and Labrador. Occup Environ Med 2010; 67: 17–23. [PubMed: 19736174]
13. Jeebhay MF & Lopata AL Occupational allergies in seafood-processing workers. Adv Food Nutr Res 2012; 66:47–73. [PubMed: 22909978]
14. Ortega HG, Daroowalla F, Petsonk EL, et al. Respiratory symptoms among crab processing workers in Alaska: Epidemiological and environmental assessment. Am J Ind Med 2001; 39:598–607. [PubMed: 11385644]
15. Aasmoe L, Bang B, Egeness C, et al. Musculoskeletal symptoms among seafood production workers in North Norway. Occ Med 2008; 58:64–70.
16. Kim JY, Kim JI, Son JE, et al. Prevalence of carpal tunnel syndrome in meat and fish processing plants. J Occup Health 2004; 46:230–4. [PubMed: 15215667]
17. Kuruganti U & Albert WJ. Ergonomic risks in fish processing workers in Atlantic Canada. Occup Ergon 2013; 11: 11–19.
18. Nag A, Vyas H, Shah P, et al. Risk factors and musculoskeletal disorders among women workers performing fish processing. Am J Ind Med 2012; 55: 833–43. [PubMed: 22648986]
19. Lucas DL, Kincl LD, Bovbjerg VE, Lincoln JM & Branscum AJ. Work-related traumatic injuries onboard freezer-trawlers and freezer-longliners operating in Alaskan waters during 2001–2012. Am J Ind Med 2014; 57(7), 826–836.
20. Syron LN, Lucas DL, Bovbjerg VE, Case S & Kincl L. Occupational traumatic injuries among offshore seafood processors in Alaska, 2010–2015. J Safety Res 2018; 66: 169–178. [PubMed: 30121103]
21. Anderson N, Bonauto D, & Adams D Prioritizing industries for occupational injury and illness prevention and research, Washington State workers' compensation claims data, 2002–2010. (Technical Report No. 64–1-2013). Olympia, WA: Washington State Department of Labor & Industries, 2013.
22. Syron LN, Kincl L, Yang L, et al. Analysis of workers' compensation disabling claims in Oregon's seafood preparation and packaging industry, 2007-2013. Am J Ind Med 2017; 60: 484–93. [PubMed: 28262964]
23. NIOSH. Workers' compensation insurance: A primer for public health. (DHHS/NIOSH Publication No. 2014–110). Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, 2014.
24. Alaska Department of Labor and Workforce Development. Workers' Compensation Home, 2013 Accessed October 12, 2017 from: http://labor.alaska.gov/wc/home.htm
25. Alaska Statute. § 23.30.070 [2017]. Alaska Workers' Compensation Act Report of injury to division Accessed May 9, 2018 from: http://www.legis.state.ak.us/basis/statutes.asp#23.30.070

26. Alaska Statute. § 23.30.230 [2017]. Alaska Workers' Compensation Act persons not covered Accessed May 9, 2018 from: http://www.legis.state.ak.us/basis/statutes.asp#23.30.230
27. 46 U.S. Code § 30104 – Personal injury to or death of seaman Accessed March 28, 2018 from: https://www.law.cornell.edu/uscode/text/46/30104
28. Kalamarides JA. The remote site doctrine in Alaska. Alaska Law Review 2004; 21:289–304.
29. WCIO. Injury Description Table - Part/Nature/Cause, 2016 Accessed May 29, 2018 from: https://www.wcio.org/Document%20Library/InjuryDescriptionTablePage.aspx
30. BLS. Occupational Injury and Illness Classification Manual Washington, DC: US Department of Labor 2012.
31. Drisko J, & Maschi T Content analysis New York, NY: Oxford University Press 2015.
32. Newman KL, Leon JS & Newman LS. Estimating occupational illness, injury, and mortality in food production in the United States: A farm-to-table analysis. J Occ Environ Med 2015; 57(7): 718–725.
33. Cartwright MS, Walker FO, Blocker JN, et al. The prevalence of carpal tunnel syndrome in Latino poultry processing workers and other Latino manual workers. J Occup Environ Med 2012; 54:198–201. [PubMed: 22258161]
34. OSHA. Prevention of musculoskeletal injuries in poultry processing. Publication 3213–12R Accessed from: https://www.osha.gov/Publications/OSHA3213.pdf
35. NIOSH. Hierarchy of controls 2018 Accessed May 29, 2018 from: https://www.cdc.gov/niosh/topics/hierarchy/default.html
36. Cohen A Worker participation. In Bhattacharya A & McGlothlin J (Eds.), Occupational ergonomics: Theory and applications Boca Raton, FL: Taylor & Francis Group 2011:243–69.
37. Redfern M & Rhoades T Fall prevention in industry using slip resistant testing. In Bhattacharya A & McGlothlin J (Eds.), Occupational ergonomics: Theory and applications Boca Raton, FL: Taylor & Francis Group 2011:525–38.
38. OSHA. Control of hazardous energy: Lockout/tagout. Publication 3120 Accessed May 29, 2018 from: https://www.osha.gov/Publications/osha3120.pdf
39. OSHA. Safeguarding equipment and protecting employees from amputations. Publication 3170–02R Accessed May 29, 2018 from: https://www.osha.gov/Publications/osha3170.pdf
40. MacDonald LA, Karasek RA, Punnett L, et al. Covariation between workplace physical and psychosocial stressors: Evidence and implications for occupational health research and prevention. Ergonomics 2001; 44: 696–718. [PubMed: 11437204]
41. NIOSH. Overtime and extended work shifts: Recent findings on illnesses, injuries, and health behaviors. (DHHS/NIOSH Publication No. 2004–143). Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health.
42. Spieler EA, & Burton JF. The lack of correspondence between work-related disability and receipt of workers' compensation benefits. Am J Ind Med 2012; 55:487–505. [PubMed: 22271439]
43. GAO. Workplace safety and health: Additional data needed to address continued hazards in the meat and poultry industry. (GAO-16–337) Accessed May 29, 2018 from: http://www.gao.gov/assets/680/676796.pdf
44. Alaska Department of Labor and Workforce Development. Alaska Occupational Safety and Health (AKOSH) Voluntary Protection Program (VPP) Accessed September 11, 2017 from: http://labor.state.ak.us/lss/vpp.htm
45. Alaska Department of Labor and Workforce Development. Alaska Occupational Safety and Health (AKOSH) Safety and Health Achievement Recognition Program (SHARP) Accessed September 11, 2017 from: http://labor.state.ak.us/lss/OSH-SHARP.htm
46. Alaska Department of Labor and Workforce Development. Alaska Occupational Safety and Health (AKOSH) Voluntary Protection Program: List of Alaska VPP Star Participants Accessed September 11, 2017 from: http://labor.state.ak.us/lss/vpp-participants.html
47. Alaska Department of Labor and Workforce Development. Alaska Occupational Safety and Health (AKOSH) Alaska SHARP participants Accessed September 11, 2017 from: http://labor.state.ak.us/lss/sharp-participants.pdf

Table 1

Alaska workers' compensation claim frequency and percentage, number of workers, and claim rate per 1,000 workers: All-industry, onshore seafood processing industry, and geographic region for the seafood processing industry, 2014–2015

	2014			2015			2014 and 2015		
	Claims No. (%)*	No. Workers	Rate (per 1,000 Workers)	Claims No. (%)	No. Workers	Rate (per 1,000 Workers)	Claims No. (%)	No. Workers	Rate (per 1,000 Workers)
Industry									
All-Industry	18,719 (100)	422,560	44	18,521 (100)	422,828	44	37,240 (100)	845,388	44
Onshore Seafood Processing	1,356 (7)	24,000	57	1,533 (8)	21,990	70	2,889 (8)	45,990	63
Geographic Region: Seafood Processing†									
Aleutians/ Pribilofs	398 (31)	7,506	53	484 (33)	6,721	72	882 (32)	14,227	62
Southeast	241 (19)	4,825	50	287 (19)	5,215	55	528 (19)	10,040	53
Bristol Bay	243 (19)	4,800	51	270 (18)	4,866	55	513 (18.5)	9,666	53
Southcentral	184 (14)	4,153	44	251 (17)	4,268	59	435 (16)	8,421	52
Kodiak	162 (13)	3,049	53	153 (10)	2,998	51	315 (11.5)	6,047	52
Anchorage/ MatSu	29 (2)	834	35	25 (2)	829	30	54 (2)	1,663	32
Western/ Yukon	21 (2)	802	26	10 (1)	529	NC	31 (1)	1,331	24
Northern	0 (0)	470	NC	3 (0)	530	NC	3 (0)	1,000	NC
Unknown	78 (−)	(−)	NC	50 (−)	(−)	NC	128 (−)	(−)	NC

*Valid percentages (which exclude missing values from the denominator) were used for all percent calculations.

NC: Rates not calculated for "unknown" categories or those with fewer than 20 claims (to avoid instability).

†Throughout the year, some workers moved between different geographic regions for their employment. In these instances, the same worker was counted in multiple geographic region categories.

Table 2

Alaska onshore seafood processing claims by nature and body part, 2014–2015

	Body Part (n=2,829)								
Nature (n=2,768)	**Shoulder, Arm, Hand**	**Back, Chest, Abdomen**	**Leg, Foot**	**Head, Face, Neck**	**Multiple Parts**	**Body System**	**Unknown**	**Total**	**(%)**
Sprain, Strain, Tear	352	368	217	11	40	0	5	993	(36)
Bruise	222	67	131	52	16	0	2	490	(18)
Laceration, Puncture, Amputation	258	4	28	55	3	0	1	349	(13)
Pain, Inflammation, Irritation	77	32	43	86	9	0	0	247	(9)
Other musculoskeletal injury/illness *	85	13	11	0	5	0	0	114	(4)
Fracture	62	5	17	11	1	0	1	97	(3.5)
Infection	6	6	12	42	0	21	1	88	(3)
Poisoning, Allergenic Effect	6	12	1	17	0	24	7	67	(2.5)
Crushing	54	1	5	0	0	0	0	60	(2)
Burn, Corrosion	16	1	6	14	0	0	0	37	(1.25)
Hernia	0	33	0	0	0	0	0	33	(1)
Abrasion, Scratch, Blister	3	0	12	15	0	0	0	30	(1)
Dermatitis	14	0	5	7	1	0	3	30	(1)
Dislocated Joint, Disc	21	2	6	0	0	0	0	29	(1)
Hearing Loss	0	0	0	14	0	0	0	14	(0.5)
Reduced Temperature Effects	6	0	4	1	0	1	0	12	(0.5)
Concussion	0	0	0	9	0	0	0	9	(0.25)
Loss of Consciousness	0	0	0	0	0	0	9	9	(0.25)
Cardiovascular Disease	0	6	0	0	0	0	1	7	(0.25)
Other	10	11	2	9	0	18	3	53	(2)
Unknown	20	17	11	12	33	1	27	121	(−)
Total (%)	1,212 (43)	578 (20)	511 (18)	355(13)	108 (4)	65 (2)	60 (−)	2,889	(100)

* Other musculoskeletal injury/illness included: unspecified soft tissue conditions that occurred over time due to repetitive activity (61); carpal tunnel syndrome (32); dorsopathies (9); epicondylitis (6); and tendonitis (6).

Table 3

Alaska on shore seafood processing claims by event/exposure and nature, 2014–2015

Event/Exposure (n=2,738)	Nature (n=2,768)								Total	(%)
	Sprain, Strain, Tear	Bruise	Laceration, Puncture, Amputation	Pain, Inflamed, Irritated	Other musculo-skeletal injury/ illness†	Fracture	Other*	Unknown		
Contact Object/Equip (n=1,020)	**83**	**338**	**307**	**100**	**0**	**65**	**95**	**32**	**1,020**	**(37)**
Struck By	*59*	*221*	*160*	*15*	*0*	*40*	*49*	*18*	*562*	
Caught /Compressed	*9*	*43*	*60*	*0*	*0*	*17*	*16*	*5*	*150*	
Striking Against	*14*	*57*	*48*	*9*	*0*	*2*	*8*	*6*	*144*	
Rubbed/Abraded By	*0*	*0*	*1*	*73*	*0*	*0*	*16*	*0*	*90*	
Unspecified	*1*	*17*	*38*	*3*	*0*	*6*	*6*	*3*	*74*	
Overexertion, Reaction (n=933)	**639**	**0**	**0**	**92**	**114**	**0**	**79**	**9**	**933**	**(34)**
Lift, Lower, Push, Pull	*457*	*0*	*0*	*27*	*0*	*0*	*37*	*6*	*527*	
Repetitive Motions	*47*	*0*	*0*	*30*	*107*	*0*	*2*	*1*	*187*	
Reach, Twist, Step, Stand	*111*	*0*	*0*	*13*	*5*	*0*	*8*	*1*	*138*	
Bodily Condition	*0*	*0*	*0*	*3*	*2*	*0*	*27*	*1*	*33*	
Unspecified	*24*	*0*	*0*	*19*	*0*	*0*	*5*	*0*	*48*	
Slips, Trips, Falls (n=448)	**217**	**128**	**25**	**16**	**0**	**28**	**14**	**20**	**448**	**(16)**
Fall on Same Level	*87*	*66*	*14*	*8*	*0*	*16*	*10*	*13*	*214*	
Slip/Trip without Fall	*66*	*20*	*1*	*2*	*0*	*0*	*1*	*0*	*90*	
Fall to Lower Level	*32*	*25*	*7*	*3*	*0*	*5*	*3*	*3*	*78*	
Unspecified	*32*	*17*	*3*	*3*	*0*	*7*	*0*	*4*	*66*	
Exposure Subst./Environ. (n=269)	**0**	**0**	**3**	**8**	**0**	**0**	**254**	**4**	**269**	**(10)**
Substance/Microbe	*0*	*0*	*3*	*5*	*0*	*0*	*189*	*4*	*201*	
Temperature Extreme	*0*	*0*	*0*	*1*	*0*	*0*	*39*	*0*	*40*	
Noise, Light	*0*	*0*	*0*	*1*	*0*	*0*	*20*	*0*	*21*	
Electricity	*0*	*0*	*0*	*0*	*0*	*0*	*3*	*0*	*3*	
Unspecified	*0*	*0*	*0*	*1*	*0*	*0*	*3*	*0*	*4*	
Transportation (n=36)	**3**	**8**	**1**	**1**	**0**	**2**	**3**	**18**	**36**	**(1)**
Insect Bite, Animal Strike (n=18)	**0**	**2**	**3**	**0**	**0**	**0**	**13**	**0**	**18**	**(1)**

Event/Exposure (n=2,738)	Nature (n=2,768)									
	Sprain, Strain, Tear	Bruise	Laceration, Puncture, Amputation	Pain, Inflamed, Irritated	Other musculo-skeletal injury/ illness†	Fracture	Other*	Unknown	Total	(%)
Violence/Assault (n=14)	**3**	**4**	**4**	**1**	**0**	**1**	**0**	**1**	**14**	**(1)**
Unknown (n=151)	**48**	**10**	**6**	**29**	**0**	**1**	**20**	**37**	**151**	(-)
Total (%)	**993 (36)**	**490 (18)**	**349 (13)**	**247 (9)**	**114 (4)**	**97 (4)**	**478 (16)**	**121 (−)**	**2,889**	**(100)**

†Nature “Other musculoskeletal injury/illness” includes: unspecified soft tissue conditions that occurred over time due to repetitive activity (61); carpal tunnel syndrome (32); dorsopathies (9); epicondylitis (6); and tendonitis (6).

*Nature “Other” major categories include: infection (88); poisoning, allergenic effect (67); crushing (60); burn/corrosion (37); hernia (33); abrasion, scratch, blister (30); dermatitis (30);dislocated joint (29); hearing loss (14); concussion (9); Loss of consciousness (9); cardiovascular disease (7).

Table 4

Alaska onshore seafood processing claims by work activity, source, and event/exposure, 2014–2015

Work Activity (n=1,950) & *Source*	Event/Exposure						Total	(%)
	Contact with Object/ Equipment	Overexertion, Bodily Reaction	Slips, Trips, Falls	Exposure Substance, Temp	Other	Unknown		
Process, can, freeze seafood on the line (n=818)	**312**	**403**	**34**	**57**	**2**	**10**	**818**	**(42)**
Bodily motion or position	*0*	*203*	*8*	*0*	*0*	*0*	*211*	
Fish, shellfish	*84*	*53*	*0*	*33*	*2*	*0*	*172*	
Tray	*72*	*67*	*0*	*0*	*0*	*0*	*139*	
Processing machinery	*47*	*6*	*0*	*3*	*0*	*0*	*56*	
Basket, bucket	*9*	*33*	*0*	*0*	*0*	*0*	*42*	
Knife	*28*	*2*	*0*	*0*	*0*	*0*	*30*	
Floor, stairs, ground	*0*	*0*	*19*	*0*	*0*	*0*	*19*	
Conveyor	*10*	*0*	*0*	*0*	*0*	*0*	*10*	
Other	*62*	*39*	*7*	*21*	*0*	*10*	*139*	
Transport, package, handle product away from the line (n=495)	**177**	**252**	**53**	**4**	**4**	**5**	**495**	**(26)**
Box, carton, bag	*29*	*78*	*0*	*0*	*0*	*0*	*107*	
Bodily motion or position	*0*	*37*	*7*	*0*	*0*	*0*	*44*	
Cart	*21*	*23*	*0*	*0*	*0*	*0*	*44*	
Rack	*24*	*17*	*0*	*0*	*1*	*0*	*42*	
Fish, shellfish	*26*	*14*	*0*	*1*	*0*	*0*	*41*	
Floor, stairs, ground	*1*	*1*	*35*	*0*	*0*	*0*	*37*	
Tray	*17*	*14*	*0*	*0*	*0*	*0*	*31*	
Basket, bucket	*8*	*8*	*0*	*0*	*0*	*0*	*16*	
Pallet, pallet jack	*11*	*14*	*1*	*0*	*0*	*0*	*26*	
Building material	*4*	*6*	*0*	*0*	*0*	*0*	*10*	
Other	*36*	*40*	*10*	*3*	*3*	*5*	*97*	
Walk, Climb/Descend (n=276)	**40**	**39**	**193**	**0**	**1**	**3**	**276**	**(14)**
Floor, stairs, ground	*2*	*10*	*134*	*0*	*0*	*0*	*146*	
Bodily motion	*0*	*20*	*26*	*0*	*0*	*0*	*46*	

Work Activity (n=1,950) & *Source*	Event/Exposure						Total	(%)
	Contact with Object/ Equipment	Overexertion, Bodily Reaction	Slips, Trips, Falls	Exposure Substance, Temp	Other	Unknown		
Ladder	*0*	*4*	*18*	*0*	*0*	*0*	*22*	
Building structure	*10*	*1*	*2*	*0*	*0*	*0*	*13*	
Other	*28*	*4*	*13*	*0*	*1*	*3*	*49*	
Maintenance, Repair (n=139)	**84**	**24**	**8**	**20**	**0**	**3**	**139**	**(7)**
Processing machinery	*14*	*0*	*0*	*0*	*0*	*0*	*14*	
Machinery, general	*12*	*0*	*0*	*0*	*0*	*0*	*12*	
Other	*58*	*24*	*8*	*20*	*0*	*3*	*113*	
Cleaning (n=120)	**47**	**19**	**20**	**34**	**0**	**0**	**120**	**(6)**
Chemical, cleaner	*0*	*0*	*0*	*18*	*0*	*0*	*18*	
Processing machinery	*14*	*0*	*0*	*0*	*0*	*0*	*14*	
Floor, stairs, ground	*0*	*0*	*14*	*0*	*0*	*0*	*14*	
Bodily motion or position	*0*	*9*	*4*	*0*	*0*	*0*	*13*	
Other	*33*	*10*	*2*	*16*	*0*	*0*	*61*	
Construction (n=22)	**8**	**12**	**1**	**1**	**0**	**0**	**22**	**(1)**
Food Services (n=21)	**5**	**12**	**0**	**4**	**0**	**0**	**21**	**(1)**
Quality Control (n=13)	**7**	**2**	**1**	**3**	**0**	**0**	**13**	**(0.5)**
Administrative (n=6)	**0**	**5**	**1**	**0**	**0**	**0**	**6**	**(0.5)**
Other (n=40)	**23**	**11**	**4**	**0**	**0**	**2**	**40**	**(2)**
Unknown (n=697)	**297**	**122**	**121**	**61**	**3**	**93**	**697**	**(−)**
Total	1,000	901	436	184	10	116	2,647	(100)

Table 5

Alaska onshore seafood processing claims by response and outcome, 2014–2015

	No.	(%)
Initial Treatment (n=2,856)		
Minor Clinic/ Hospital Remedies/Diagnostics	2,114	(74)
No Medical Treatment	270	(9.5)
Emergency Evaluation, Diagnostics, Procedures	255	(9)
Future Major Medical/Lost Time Anticipated	105	(3.5)
Minor Onsite Remedies by Employer	104	(3.5)
Hospitalization > 24 Hours	8	(0.5)
Claim Type (n=2,889)		
Medical Only	1,827	(63)
Became Lost Time/Indemnity	516	(18)
Lost Time/Indemnity	391	(13)
Notification Only	138	(5)
Became Medical Only	17	(1)